



**National  
Transportation  
Safety Board**

# **Managing Fatigue in Aviation: Enhancing Flight Safety**

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Board Member**

**Aviation Safety Coordinators  
July 24, 2013**



- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**





All Modes



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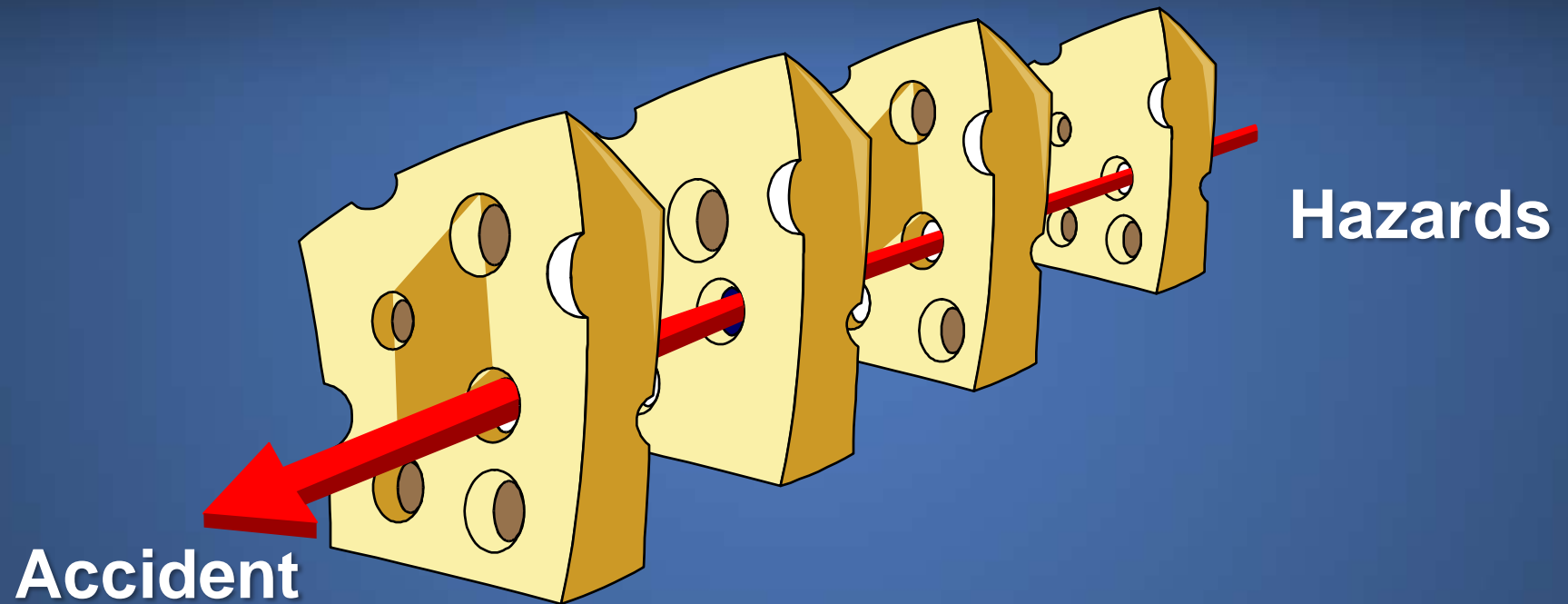


# Independent Federal Agency: Created in 1967

- ~ 132,000 accident investigations
- 13,500+ safety recommendations
- ~ 2,500 organizations/recipients
- 82% acceptance rate



# “Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards

# NTSB Characterized as:

‘moral compass and industry conscience’

NTSB Chairman Deborah A.P. Hersman



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# Go! Flight 1002



- early starts, multiple segment days, sleep apnea



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Honorable John K. Lauber:

No Accident  $\neq$   
Safe Operation



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# Uncontrolled In-Flight Collision with Terrain AIA Flight 808, Douglas DC-8-61, N814CK U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

First NTSB aviation accident investigation  
to cite fatigue as probable cause

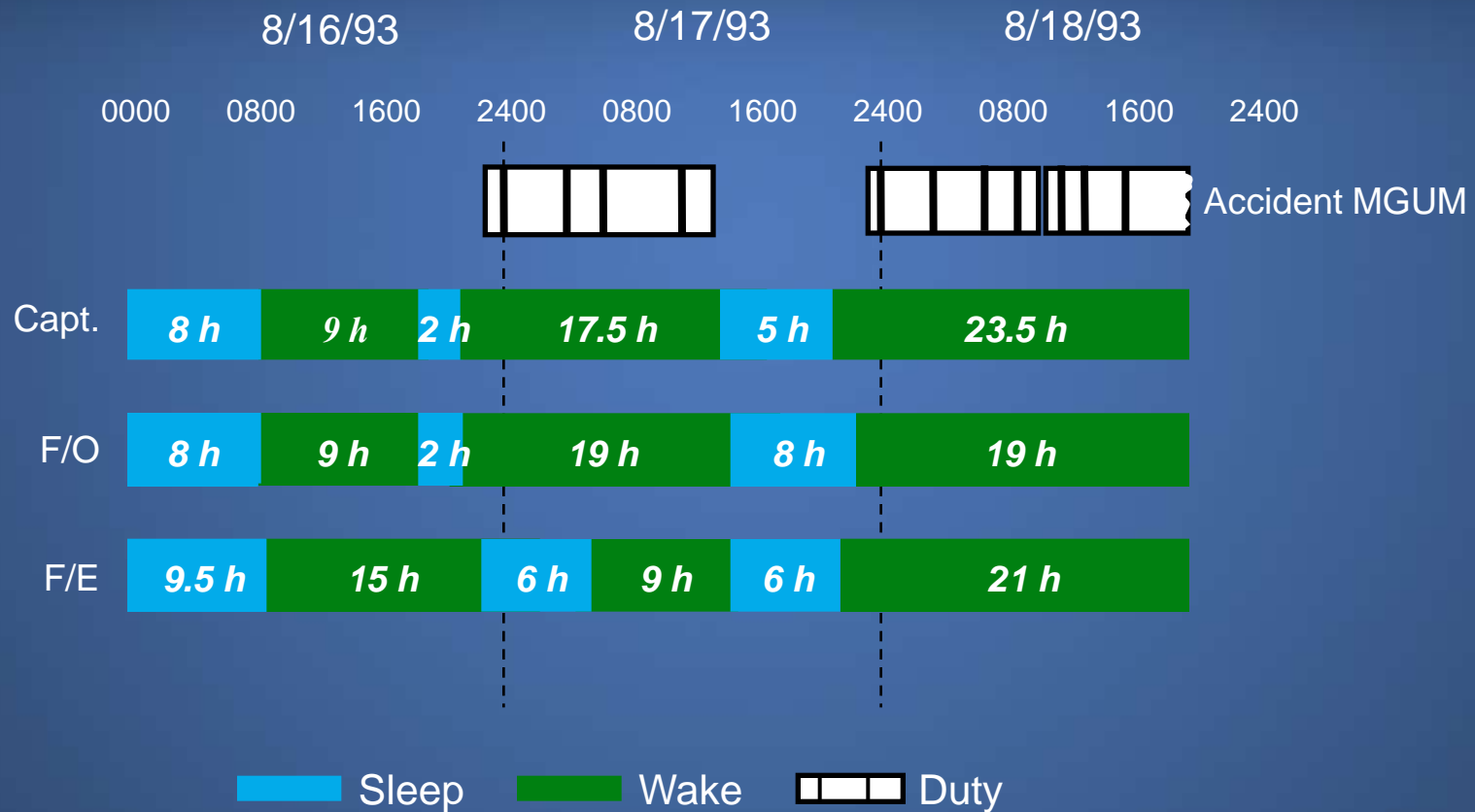


- acute sleep loss, sleep debt, circadian disruption



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# Crew Sleep History



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# Observed Performance Effects

- Degraded decision-making
- Visual/cognitive fixation
- Poor communication/coordination
- Slowed reaction time



Uncontrolled In-Flight Collision with Terrain  
AIA Flight 808, Douglas DC-8-61, N814CK  
U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

“The National Transportation Safety Board determines that the probable causes of this accident were the impaired judgment, decision making, and flying abilities of the captain and flight crew due to the effects of fatigue...”



# Owatonna, MN (July 31, 2008)



8 fatalities



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# Owatonna Crew Fatigue Factors

- acute sleep loss (Capt/FO)
- cumulative sleep debt (FO)
- early start time (Capt/FO)
- excessive sleep need (Capt)
- insomnia (FO)
- self-medicate/prescription sleep med (FO)



# Probable Cause/Contributing Factors

“Contributing to the accident were . . .  
(2) fatigue, which likely impaired both  
pilots’ performance; . . .”



# Fatal Airline Accidents (Examples) (fatigue cited)

- 8/97 Guam: 228 fatalities
- 6/99 Little Rock AK: 11 fatal
- 10/04 Kirksville MO: 11 fatalities
- 8/06 Lexington KY: 49 fatalities
- 7/08 Owatonna MN: 8 fatalities
- 2/09 Buffalo NY: 49 fatalities



# Challenges of a 24/7 Society



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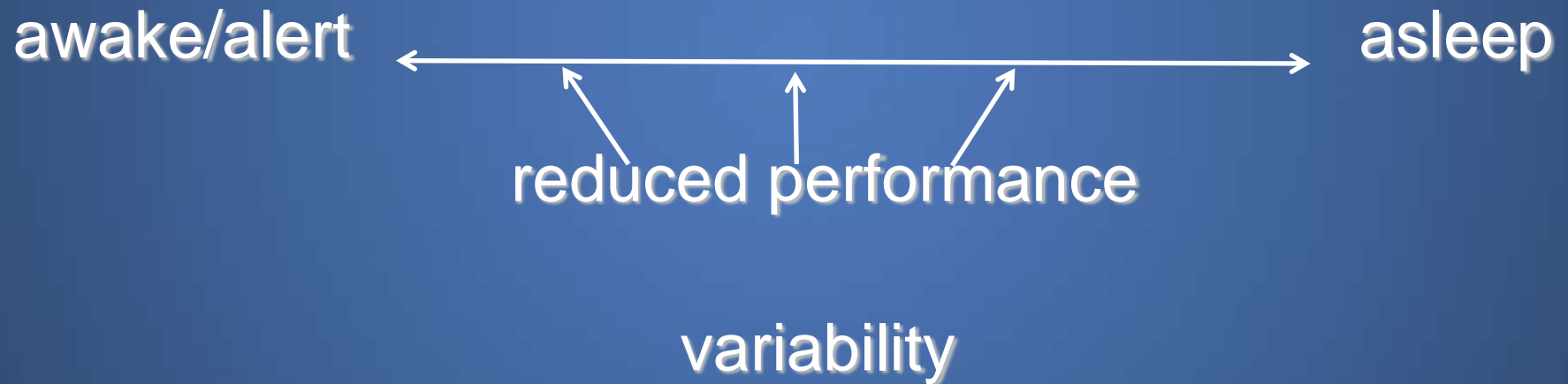
# Fatigue Risks

Fatigue can degrade  
every aspect of  
human capability.





# Fatigue Risks



# Fatigue Risks

- degraded 20 – 50%+:

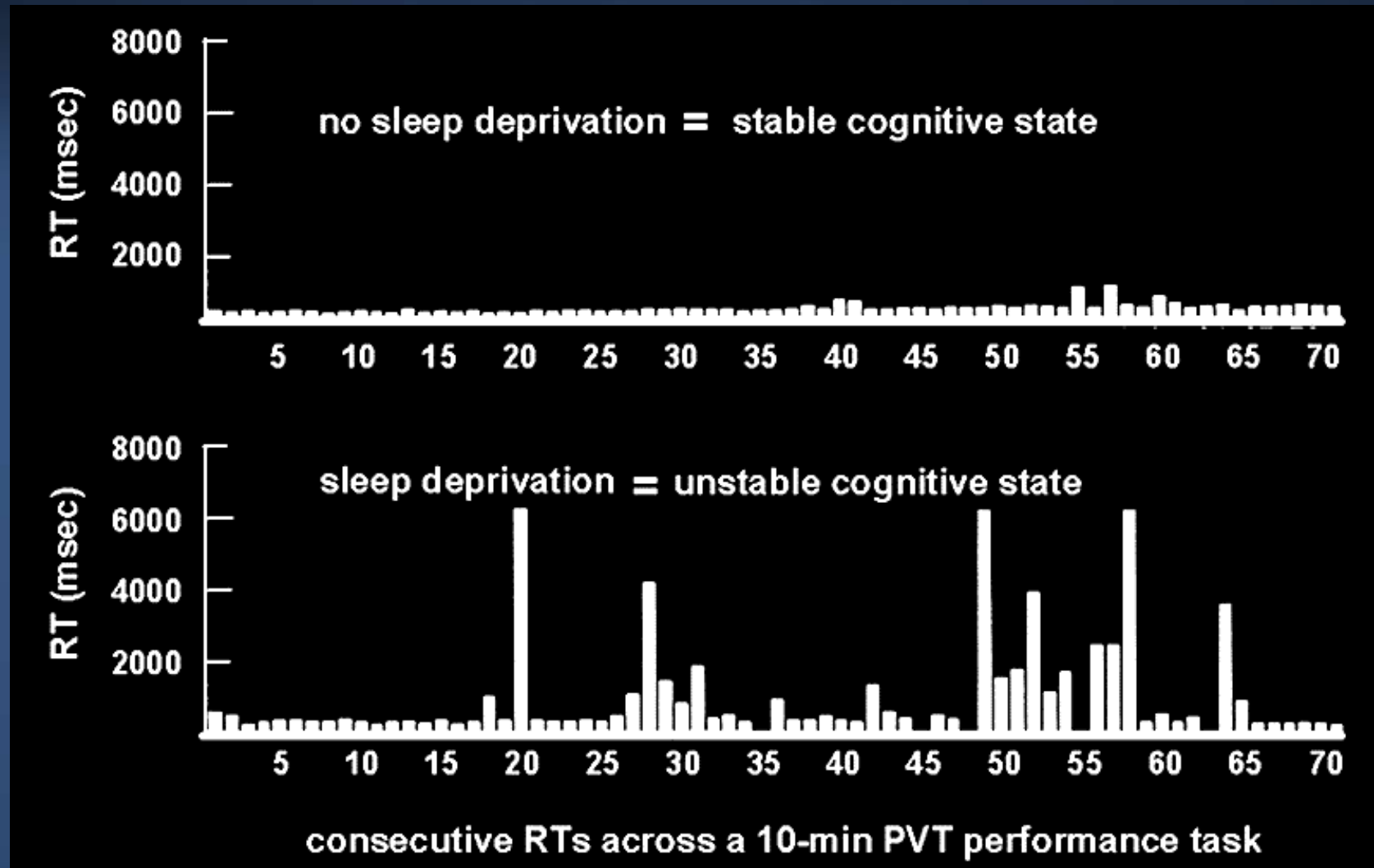
- reaction time
- memory
- communication
- situational awareness
- judgment
- attention
- mood

- increased:

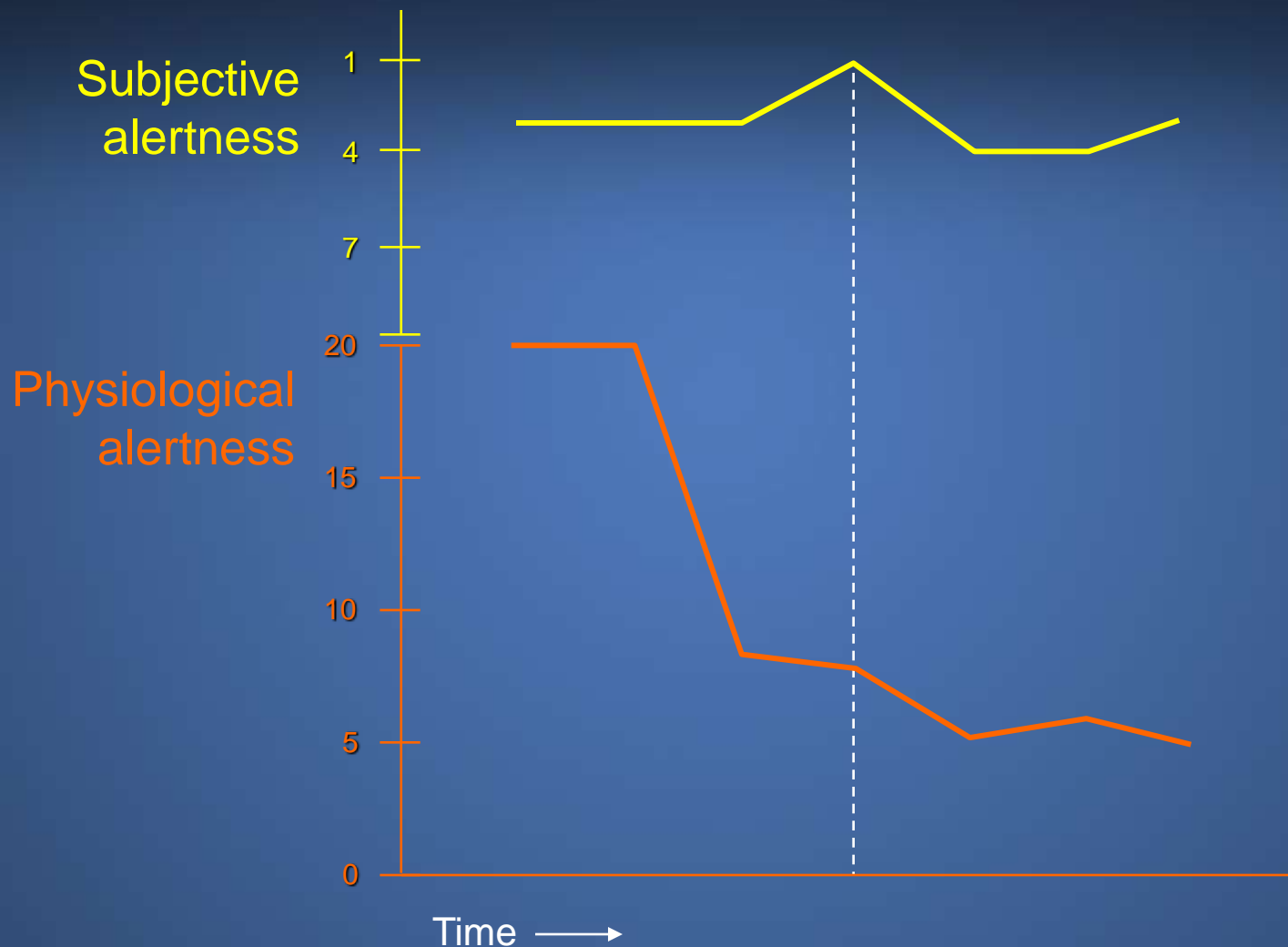
- irritability
- apathy
- attentional lapses
- microsleeps



# Fatigue and Reaction Times



# Alertness Reports Often Inaccurate



Adapted from Sasaki et al., 1986



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# Fatigue Factors

- sleep
- circadian clock
- hours awake
- sleep disorders





# NTSB Safety Recommendations: Fatigue

- 40 years ago: May 10, 1972
- “Revise FAR 135 to provide adequate flight and duty time limitations.” (A-72-55)
- Classified “Closed-Unacceptable”





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### MOST WANTED LIST

A program to increase the public's awareness of, and support for, action to adopt safety steps that can help prevent accidents and save lives. The following are ten of the current issues.



Addressing Human Fatigue



General Aviation Safety



Safety Management Systems



Runway Safety



Bus Occupant Safety



Pilot & Air Traffic Controller Professionalism



Recorders



Teen Driver Safety



Addressing Alcohol-Impaired Driving



Motorcycle Safety



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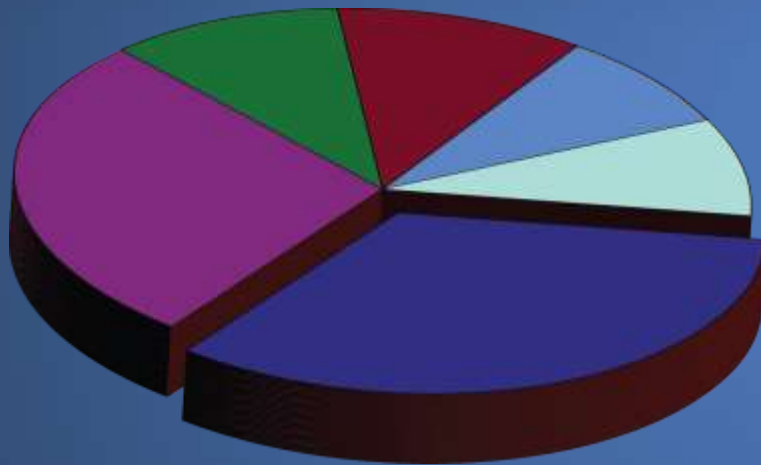
# NTSB Recommendations

- MOST WANTED 1990 - 2012
- ~200 fatigue recommendations



# Complex Issue:

## Requires Multiple Solutions



- Scheduling Policies and Practices
- Education/Awareness
- Organizational Strategies
- Healthy Sleep
- Vehicle and Environmental Strategies
- Research and Evaluation



# NTSB Recommendations: Education/Strategies

- Develop a fatigue education and countermeasures training program
- Educate operators and schedulers
- Include information on use of strategies: naps, caffeine, etc.
- Review and update materials



# NTSB Recommendations: Education/Strategies

- Include information on use of strategies: naps, caffeine, etc.
- No recommendations on specific personal strategies





# Manage Fatigue = Enhance Safety

- Acknowledge risks
- Educate everyone
- Strong policies
- Take action/use strategies!
- Promote culture change



Good sleep, safe travels



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